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adverse criticism are the following: 1st, that animals, excepting primates, cannot and do not learn the simplest acts from seeing their fellows do them; 2nd, "that the elements in the associative processes are sense-impressions, plus a past 'impulse and act,' rather than between two sense-impressions, one past, and one present." He would argue, if I interpret him aright, that in order for the product of the associative processes to be advantageous to increase intelligence, one of the elements must be an impulse from the motor side as opposed to the idea which maintains that the associative elements in animal psychosis may be between sensations or even between memory images of an elaborate order. For those of us who have an abiding interest and faith in comparative psychology as an important auxiliary to the study of mind, the chief value of the paper lies in its testing a simple method whereby more of the facts of animal psychosis may be set forth.

L. W. KLINE.

A Primer of Psychology, by EDWARD BRADFORD TITCHENER. The Macmillan Co., N. Y., 1898. Price, \$1.

A good elementary text-book is by no means easy to write; it is a most searching test both of the real condition of the science for which it is written and of the degree in which the writer has mastered his subject. To write up "results" for Archives or technical journals is one thing, to distil off the vital essence of a science for beginners is quite another. Such a book ought not to be a mere description of the "wonders" of the science in question, still less an abstract account of its theory; it must show the theory alive and luminous in phenomena actually present.

The peculiar merit of Prof. Titchener's primer is the successful attempt to do just this. The general treatment is not only concrete and sufficiently untechnical, but each of the fifteen chapters is followed by a section of "Questions and Exercises," intended to lead the student not only to the better comprehension of the text, but also to an intelligent observation of his own mental experiences. When practicable these observations are given an experimental form, and an appendix is devoted to a convenient list of apparatus and materials, with names and addresses of makers, and prices.

The book, however, covers a much wider field than that of laboratory psychology. After introductory chapters on the nature and methods of the science, the topics of sensation, feeling, and attention are taken up in that order, to be followed by those of perception, idea and association, emotion, simpler forms of action; then memory and imagination, thought and self-consciousness, sentiment, and complex forms of action; the work is concluded by a chapter on abnormal psychology, and another on animal and child psychology and the relation of psychology to ethics, logic and pedagogy. As will be seen from this list, the order of treatment is somewhat peculiar. In the reviewer's opinion it is not altogether happy,—certain logical and systematic advantages having been gained at the expense of a natural pedagogical approach.¹

The present state of psychological science is apparent in the varying interest of the chapters, those upon matters little touched as yet by the newer methods being painfully skeletonsque. For this, of course, the author cannot be held responsible. It is to be regretted, however, that he did not give more explicit attention to mental

¹It is perhaps fair to say that the plan is simpler than the chapter headings would suggest, being the usual threefold division treated successively at different levels of complexity: 1, Sensation, Feeling, Attention; 2, Perception (with idea and association), Emotion, Simple Action; 3, Higher Intellect, Sentiment, Complex Action.

hygiene based upon psychological principles, especially as the book is intended for normal and high school students. A few minor inaccuracies also and inadvertencies of expression might well receive attention in another edition; *e. g.*, on p. 33 it seems to be implied that imagination is dependent on changes of blood supply, on pp. 44-45 in considering giddiness the otolith organs are mentioned, but the semicircular canals are not, and on p. 50 the intensity of moonlight is taken much too high. The book is valuable enough, however, to carry off many more than these deficiencies, and will, no doubt, prove extremely helpful even to many above the level for which it was first designed.

E. C. S.

The Influence of High Arterial Pressures Upon the Blood-Flow Through the Brain. W. H. HOWELL. *American Journal of Physiology*, I. (1898), 57-70.

The physiology of the cerebral circulation is a difficult and obscure matter, and has been made even more difficult of comprehension by the supposition that, because the brain itself is practically incompressible and encased in an inextensible skull, any enlargement of the arteries under increased blood pressure must bring about a corresponding compression of the veins, which would hinder the outflow of the blood, and, in case of a sudden and great rise of arterial pressure, might produce anæmia by preventing it altogether. Recent experiments by several observers, however, have made clear that this reasoning was somewhere at fault, for when the arterial pressure in living animals has been made very high by the administration of drugs, the outflow has not been diminished. Prof. Howell has carried these experiments further, and, it would seem, entirely closed the question by showing in the case of dogs previously killed, that even very great pressures (*e. g.*, 500 mm. of mercury, or about 9.7 lbs. per square inch) do not cause any decrease of the outflow from the cerebral veins; in other words that "the circulation in the brain behaves in this respect precisely as it does in the other organs of the body; the greater the arterial pressure the more abundant is the flow of blood." The arterial enlargement is indeed compensated by compression of the veins (and they even show a pulse, due, apparently, to the increase of compression at each arterial pulse) but their total bore is considerably greater than that of the arteries, so that they are never seriously occluded, while the large sinuses, which might suffer more, are protected by tough dural sheaths.

E. C. S.

On the Relation Between the External Stimulus Applied to a Nerve and the Resulting Nerve Impulse as Measured by the Action Current. C. W. GREENE. *American Journal of Physiology*, I. (1898), 104-116.

Experiments were made on the excised nerves of frogs, terrapin, cats and dogs. The curves for the relation of the stimulating current and current of action, plotted from the results, show three stages: The first rising sharply from the abscissa and practically straight, the third also straight and nearly parallel to the abscissa, and the second, a curve with its concavity toward the abscissa, connecting the other two. The first stage extends from the smallest stimuli awakening any response up to the intensity required to bring out maximal muscular contractions and considerably beyond; it is the expression of an arithmetical ratio, each increase in stimulus bringing out a proportional and decided increase in the current of action. The third also represents an arithmetical ratio, but the increase for each unit of stimulus, while still proportional, is quite small. In the nerves of